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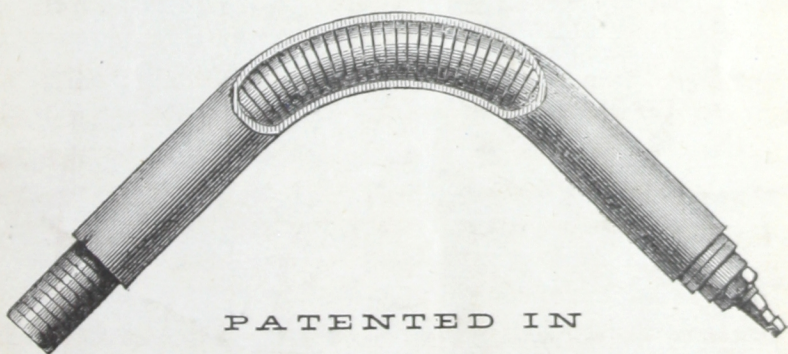
DESCRIPTIVE CIRCULAR

OF

Orum's Flexible Mandrel

FOR

BENDING METAL PIPE.



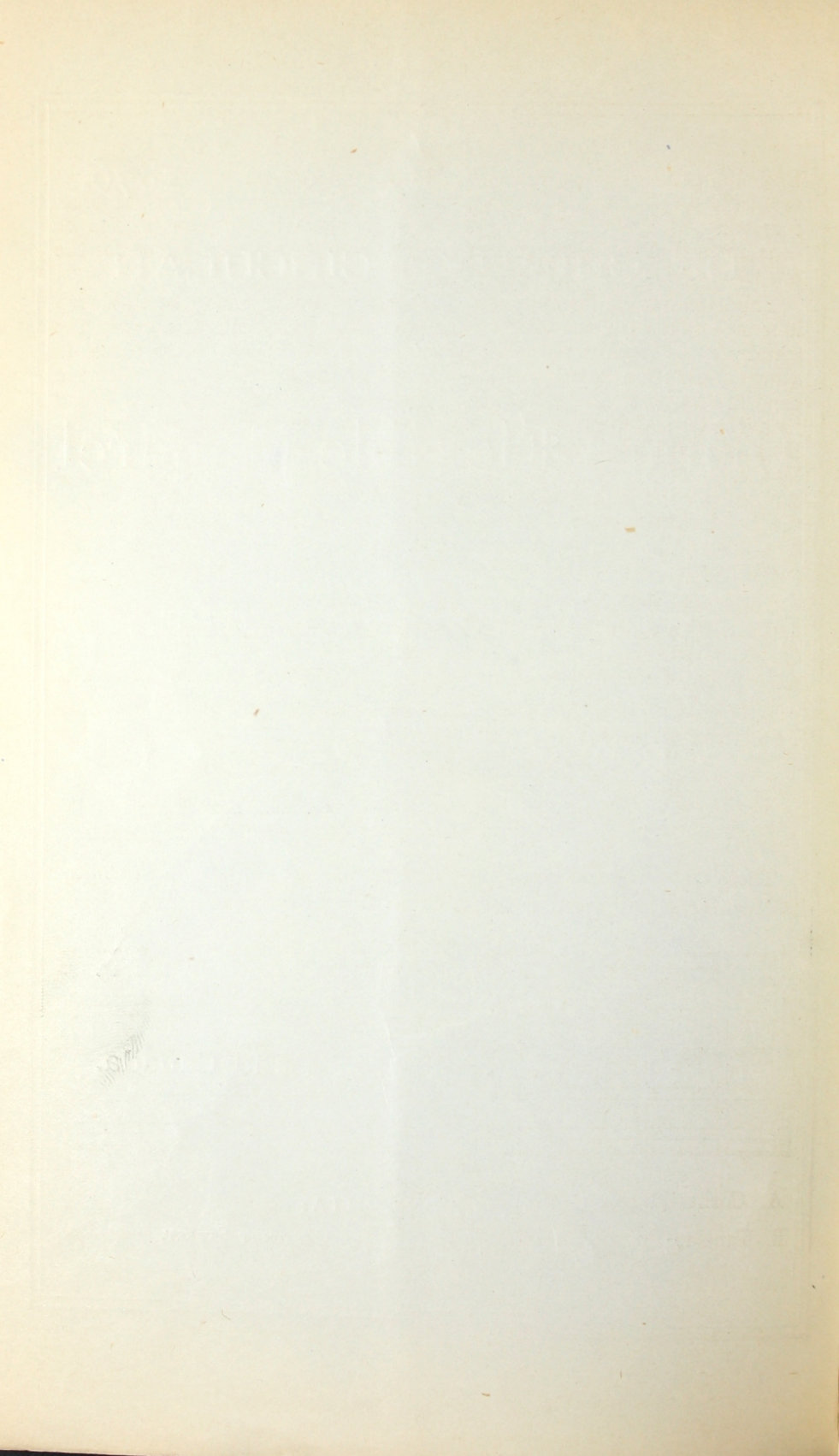
PATENTED IN

United States, Great Britain and Canada.

PHILADELPHIA:

G. V. TOWN & SON, PRINTERS, 529 CHESTNUT STREET.

1876.





The attention of Railroad Companies, Locomotive and Marine Engine Builders, Coppersmiths, and others having occasion to bend or use tubes requiring to be bent, is called to a new device for bending metal pipe, consisting of a flexible mandrel, which is placed inside the pipe to be bent, instead of the resin, lead or other substances ordinarily used for the purpose.

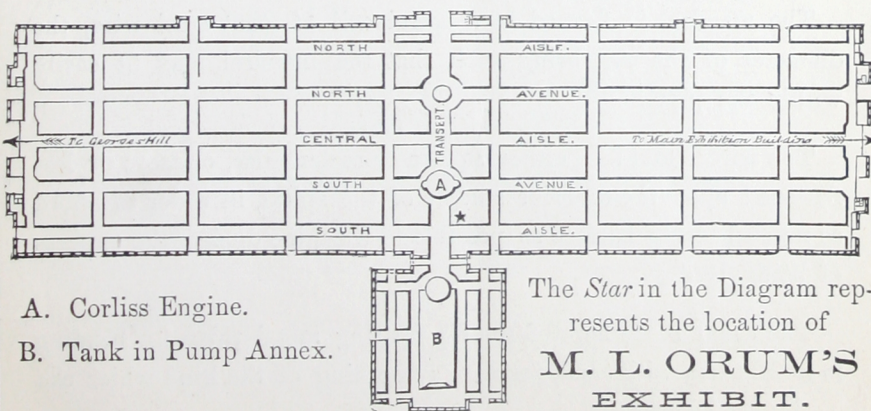
The usual means for applying the bending pressure may be employed in connection with these mandrels, and after the bends are made, the mandrels are readily removed by means of a common auger-brace, in connection with a key, which fits the end of the mandrel. In making a bend in any portion of a long pipe, the mandrel need be but little longer than the desired bend, a key being used which will reach the mandrel. By this means bends have been produced in tubes of twenty feet length by the use of a mandrel thirty inches long. For making coils the pipe can be bent the length of mandrel, which can then be moved along, and the bend continued, the process being repeated as often as necessary. The tubes to be bent must be annealed as usual, except in case of slight curves, which can readily be made in hard pipe by this process.

These mandrels have been tested in Philadelphia, New York, Cincinnati and Pittsburgh, before judges appointed for that purpose, the reports of whom will be found annexed, and to which we refer for minute description of the apparatus, its efficiency in use, and accuracy of results.

Licenses will be granted and mandrels furnished on reasonable terms by addressing the inventor and patentee.

MORRIS L. ORUM,  
(Care of J. SNOWDEN BELL,)
   
702 Chestnut St., Philadelphia.

These mandrels, and bends produced with them, are now on exhibition in Machinery Hall, Section B, 5, Column 40. See annexed plan.



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*No. 984.*

HALL OF THE FRANKLIN INSTITUTE,

*Philadelphia, April 1st, 1876.*

The Committee on Science and the Arts, constituted by the Franklin Institute of the State of Pennsylvania, to whom was referred for examination Morris L. Orum's Flexible Mandrel for Bending Metallic Tubing, report that they have examined the device, and find it to be all that is claimed for it by the Inventor.

The mandrel is formed of a spiral coil of stout steel wire, the diameter of the coil being such that the mandrel may fit easily within the pipe.

The wire should be either square or rectangular, or more or less flattened upon the exterior surface of the spiral, in order to afford as much bearing surface as possible to the pipe during the process of being bent.

The usual mode heretofore of preparing metal tubes for bending is to fill them with sand, rosin, or something of the kind which can



be removed without injury to the tube after being bent. The object of this filling is to maintain the cylindrical form of the tube at the point where the bending takes place. Without such filling the tube would be flattened and the area reduced thereby, and even with such precaution great care has to be taken by the workmen to prevent a reduction of diameter in one direction.

This mandrel seems to overcome this difficulty entirely, and is the only possible form of mandrel that we can think of which could be removed without injury to the tube or mandrel after the tube is bent. By taking hold of one end of the mandrel when fixed at the other end and turning it, you either increase or diminish the diameter, so that by turning it in the proper direction to diminish it while in the bent tube, it is easily removed, and, being made of properly tempered steel, returns to its original diameter, and is again ready for use.

The Committee think the invention a very creditable one, and that it will be highly appreciated by those who have had much to do with the bending of cold metallic tubes.

Respectfully submitted by yours truly,

(Signed)      { WILLIAM HELME,  
WASHINGTON JONES, } *Sub-Committee.*  
E. LONGSTRETH, }

April 5, 1876. Passed second reading, and, by resolution, the Scott Legacy Premium and Medal is awarded.

(Signed)      COLEMAN SELLERS, *Chairman.*



CINCINNATI INDUSTRIAL EXHIBITION, 1875.

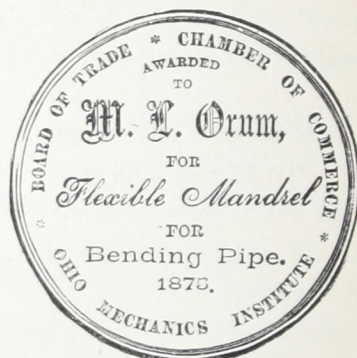
REPORT OF BOARD OF EXPERTS

ON

**Morris L. Orum's Flexible Mandrel**

FOR

**BENDING METAL PIPE.**



*"Exhibit 1143."*

"SPECIAL MANDREL FOR BENDING OF METAL PIPE."

This is an exceedingly ingenious arrangement, and, in our opinion, of great value in its special department.

The mandrel is simply a strong, closely-wound steel helix, of uniform external diameter, and of length somewhat greater than the designed curvature of pipe. In one end of the mandrel is securely fastened a nut, into which a stem is screwed for removing it from the pipe after the bending.

In operation, the mandrel is thrust into the section of pipe to be



curved; the pipe is then bent to the required form in machines similar to those in general use in locomotive shops. After the bending is complete, the mandrel is withdrawn by screwing the stem into the nut, and revolving it in an opposite direction to the lead of the helix; turning the mandrel thus has an effect to sensibly contract the diameter and make the withdrawal rather easy.

Samples of pipe bent on these mandrels are very perfect, and exhibit a regular contour of curvature. In ordinary practice, bent pipes exhibit a change in figure of cross section; that is, a pipe which is in section round before the bending takes place, is of an elliptical section after the bending, the major diameter being at right angles to the radius of curvature. In pipes bent on this mandrel, the form of cross section remains unchanged.

The usual method of filling pipes for bending has been to pour into them a mass of melted rosin, sufficient to fill that portion of the pipe to be bent, and to extend beyond in either direction sufficiently to preserve the solidity of filling during the process of bending. After the pipe is bent, the mass of rosin is melted out, care being taken that in the melting the pipe itself is not overheated. The use of rosin or an equivalent is not only expensive, but the time required to melt and introduce it into the pipe, and re-melt or withdraw it again, makes an instrument, which, if its only object was to economize time, very valuable, and when, in addition to economy of time, it produces a perfection of finish hitherto unattained, it is certainly worthy of every encouraging influence that can be laid about it.

We recommend an award of SILVER MEDAL.

(Signed)

JOHN W. HILL,  
*Chairman Board of Experts.*



FORTY-FOURTH  
GRAND NATIONAL EXHIBITION

OF THE

American Institute of the City of New York.



OFFICE OF THE GENERAL SUPERINTENDENT,

*New York, March 7th, 1876.*

*Copy of the Judges' Report in Department V, Group 3, at the Forty-fourth Exhibition of the American Institute, held in the City of New York, October, 1875.*

No. 416. FLEXIBLE MANDREL FOR BENDING PIPE.

MORRIS L. ORUM, Philadelphia, Pa.

*This is a happy thought; the mandrel is perfectly effective, and can be readily withdrawn. We recommend for it the award of a Silver Medal.*

SILVER MEDAL AWARDED.

CHAS. WAGER HULL,  
General Superintendent.



OFFICE OF THE

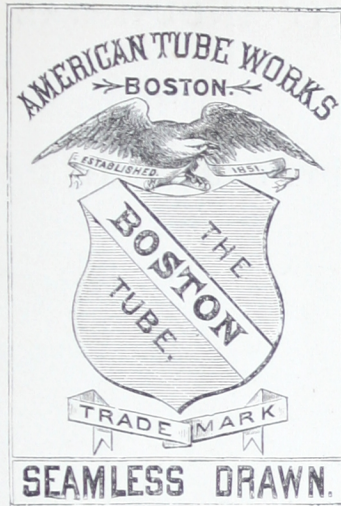
**AMERICAN**

SOLE MANUFACTURERS

Green's & Alston's Patent

SEAMLESS DRAWN

BRASS TUBES,



**TUBE WORKS.**

IN AMERICA OF

Adams's Patent

SEAMLESS DRAWN

COPPER TUBES,

FOR

Locomotive, Marine and Stationary Boilers,

AND

OTHER PURPOSES.

WILLIAM C. COTTON, Treasurer,  
97 State Street.

*Boston, June 12, 1876.*

MR. MORRIS L. ORUM,  
*Philadelphia, Pa.*

DEAR SIR:

We have tried your "Patent Mandrel," and find that with it we easily bent our tubes to long or short curves without flattening or buckling, and avoided the labor and expense of filling and cleaning

Yours truly,

AMERICAN TUBE WORKS,

by E. B. BUCKINGHAM,

*President.*

# TRADESMENS' INDUSTRIAL INSTITUTE

OF

PITTSBURGH, PA.

OFFICE OF SECRETARY,

*Pittsburgh, May 19, 1876.*

MORRIS L. ORUM, ESQ.,

*Philadelphia, Pa.*

SIR:

The following is an exact copy of the Report of the Judges on Class 5, Entry 1100,—to wit:

"The *Flexible Mandrel* for bending pipes has great merit, and is a very important invention, producing results in bending tubes which could not be obtained by any of the old methods in bending pipes or tubes. Deserves a Silver Medal."

(Signed)

A. W. TABER,

EDWARD ARMSTRONG,

} *Jurors.*

I certify the above to be an exact copy of Report of Judges.

JAMES JOHNSON, *Secretary.*



